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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/026,120

12/21/2001

Wenjie Li

FIS9-2001-0381-US

5036

32074

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01/08/2004

EXAMINER

LEE, SIN J

INTERNATIONAL BUSINESS MACHINES CORPORATION

DEPT. 18G

BLDG. 300-482

2070 ROUTE 52

HOPEWELL JUNCTION, NY 12533

ART UNIT

PAPER NUMBER

1752

DATE MAILED: 01/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/026,120	LI ET AL.	
	Examiner	Art Unit	
	Sin J. Lee	1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11-19 is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5 and 8-10 is/are rejected.
- 7) ☒ Claim(s) 3 and 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

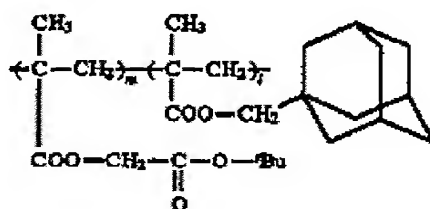
DETAILED ACTION

1. Applicants canceled claims 7 and 20.
2. In view of the amendment of October 14, 2003, previous 102(e) rejections on claims 1, 2, 4-7, 9-11, 13-15, and 17-20 over Hasegawa et al'465, previous 103(a) rejections on claims 3, 8, and 16 over Hasegawa et al'465, and previous 103(a) rejection on claim 12 over Hasegawa et al'465 in view of Lin'453 are hereby withdrawn since Hasegawa does not teach present non-polymeric silicon additive which is free of acid labile moieties and/or which contain lactone.
3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

4. Claims 1, 2, 4, 5, 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoai et al (5,693,452).

In Example 18, Aoai teaches (see Table 3 and col.43, lines 1-5, col.46, lines 30-39) a resist composition containing an *acid-decomposable group-containing resin* (xxi), which chemical structure is



, and a *photoacid*

generator. Aoai furthermore teaches (col.52, lines 51-67, col.53, lines 1-5) that an adhesion aid compound can be added to his resist composition in order to improve the adhesion between the substrate and his resist, particularly to prevent peeling of the resist in the etching process. As kinds of the adhesion aid compound that can be used, Aoai lists chlorosilanes, alkoxysilanes, silazanes, silanes, heterocyclic compounds, and ureas. Since there are only six kinds of adhesion aid compound listed, it would have been obvious to one of ordinary skill in the art to choose the chlorosilane compound as the adhesion aid for Aoai's resist composition with a reasonable expectation of improving the adhesion between the substrate and the resist, particularly to prevent peeling of the resist in the etching process as taught by Aoai. Also, Aoai lists only four specific examples for the chlorosilane compound, one of which is methyl diphenylchlorosilane ((C₆H₅)₂(CH₃)Si-Cl), which has 13 carbon atoms and has two aromatic ring structures. Therefore, it would have been obvious to one of ordinary

skill in the art to specifically use methyldiphenylchlorosilane in Aoai's resist composition as the adhesion aid with a reasonable expectation of improving the adhesion between the substrate and the resist, particularly to prevent peeling of the resist in the etching process as taught by Aoai. Therefore, Aoai's teaching would render obvious present non-polymeric silicon additive which is free of acid labile moieties, and thus Aoai would render present inventions of claims 1, 2, 5, and 9 obvious.

With respect to present claim 4, Aoai teaches (col.47, lines 4-11, col.53, lines 6-9) that the adhesion aid is preferably added in the amount of less than 3 parts by weight per 100 parts by weight of the solid content of the composition of his invention and that his acid-decomposable group-containing resin is used in the amount of 40 to 95 % by weight based on the total weight of the photosensitive composition (excluding the solvent). Assuming that one uses the adhesion aid in the amount of 2 parts by weight per 100 parts by weight of the solid content of Aoai's composition (which is the same as using 2 % by weight of the adhesion aid based on 100 % by weight of the solid content of Aoai's composition) and uses the acid-decomposable group-containing resin in the amount of 40 % by weight based on 100 % by weight of the solid content of Aoai's composition, this would give 2 % by weight of the adhesion aid per 40 % by weight of the resin, which converts to *5 % by weight of the adhesion aid* based on 100 % by weight of the resin. Therefore, Aoai's teaching would render obvious present invention of claim 4.

With respect to present claim 8, as discussed above, since Aoai teaches only six kinds of adhesion aid compound, it would have been obvious to one of ordinary skill in

the art to choose the silazane compound as the adhesion aid for Aoai's resist composition with a reasonable expectation of improving the adhesion between the substrate and the resist, particularly to prevent peeling of the resist in the etching process as taught by Aoai. Also, Aoai lists only four specific examples for the silazane compound, one of which is hexamethyldisilazane $((\text{CH}_3)_3\text{Si}-\text{NH}-\text{Si}(\text{CH}_3)_3)$ which contains *two silicon-containing moieties*. Therefore, it would have been obvious to one of ordinary skill in the art to specifically use hexamethyldisilazane in Aoai's resist composition as the adhesion aid with a reasonable expectation of improving the adhesion between the substrate and the resist, particularly to prevent peeling of the resist in the etching process as taught by Aoai. Therefore, Aoai's teaching would render obvious present non-polymeric silicon additive which is free of acid labile moieties and containing at least two silicon-containing moieties, and thus Aoai would render present invention of claim 8 obvious.

With respect to present claim 10, as discussed above, since Aoai teaches only six kinds of adhesion aid compound, it would have been obvious to one of ordinary skill in the art to choose the silane compound as the adhesion aid for Aoai's resist composition with a reasonable expectation of improving the adhesion between the substrate and the resist, particularly to prevent peeling of the resist in the etching process as taught by Aoai. Also, Aoai lists only four specific examples for the silane compound, one of which is γ -chloropropyltrimethoxysilane which FW is 198.72 and which boiling point is 195°C (according to Aldrich Catalog). Therefore, it would have been obvious to one of ordinary skill in the art to specifically use γ -

chloropropyltrimethoxysilane in Aoai's resist composition as the adhesion aid with a reasonable expectation of improving the adhesion between the substrate and the resist, particularly to prevent peeling of the resist in the etching process as taught by Aoai. Therefore, Aoai's teaching would render obvious present non-polymeric silicon additive which is free of acid labile moieties and having a weight average molecular weight of less than 3000 and boiling point of at least 150°C, and thus Aoai would render present invention of claim 10 obvious.

Allowable Subject Matter

5. Claims 3 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Aoai's acid-decomposable group-containing resin does not contain fluorine moieties or silicon as presently required in claims 3 and 6 respectively, nor does the reference suggests the use of such resin.

6. Claims 11-19 are allowed. Aoai coats his resist composition directly onto a substrate such as a silicon wafer, and the reference does not teach or suggest present step of forming a planarizing layer over the substrate material which is required in present claim 11.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is (571)272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff, can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

S. J. Lee

S. Lee
December 27, 2003

Sin J. Lee

Sin J. Lee
Patent Examiner
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Mark F. Huff

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